

*Pseudanthessius comanthi* n. sp. (Copepoda, Cyclopoida) Associated  
with a Crinoid at Eniwetok Atoll<sup>1</sup>

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ABSTRACT: A cyclopoid copepod, *Pseudanthessius comanthi* n. sp., is described from the crinoid *Comanthus bennetti* (J. Müller) at Eniwetok Atoll.

COPEPODS of the genus *Pseudanthessius* are known to be associated with several crinoid genera, including *Tropiometra*, *Cenometra*, *Heterometra*, *Stephanometra*, *Lamprometra*, *Liparometra*, *Dichrometra*, and *Comaster*, all in the Indian Ocean (Madagascar, India) and Red Sea (Gulf of Aqaba) (Humes and Ho, 1970; Stock, 1967). The new species to be described here is the first *Pseudanthessius* reported from crinoids in the Pacific Ocean and the first record from *Comanthus*.

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I am indebted to Miss Ailsa M. Clark of the British Museum (Natural History), London, for the identification of the host crinoid.

*Pseudanthessius comanthi* n. sp.

Fig. 1-4

*Type Material*

One hundred forty-three females, 123 males and 28 copepodids from one crinoid *Comanthus bennetti* (J. Müller), in 4 m, Rigili (Leroy) Island, Eniwetok Atoll, Marshall Islands, 3 July 1969. Holotype (female), allotype, and 220 paratypes (120 females, 100 males) deposited in the National Museum of Natural History (USNM), Washington; the remaining paratypes in the author's collection.

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*Other Specimens*

Fifteen females, 12 males from one *Comanthus bennetti*, in 8 m, at pinnacle, west of Parry (Elmer) Island, Eniwetok Atoll, 13 June 1969.

*Description of Female*

Body (Fig. 1a, b) slender and slightly thickened dorsoventrally. Length (not including setae on caudal rami) 0.79 mm (0.74-0.84 mm) and greatest width 0.29 mm (0.24-0.30 mm), based on 10 specimens in lactic acid. Ratio of length to width of prosome 1.60:1. Ratio of length of prosome to that of urosome 1.64:1. Segment of leg 1 fused with head. Epimera of segments of legs 1-4 not strongly developed.

Segment of leg 5 (Fig. 1c)  $55 \times 97 \mu$  (width including fifth legs). Genital segment in dorsal view  $135 \times 94 \mu$  in greatest dimensions. Anterior and middle thirds of segment dorsally prominent (Fig. 1d). Segment bulging laterally near its middle, where the dorsolateral genital areas are situated. Each genital area (Fig. 1e) with a plumose seta  $28 \mu$ , a naked seta  $17 \mu$ , and a small spiniform process. Posteromedial to each genital area a strongly sclerotized spine about  $11 \mu$ . Three postgenital segments  $33 \times 52 \mu$ ,  $26.5 \times 47 \mu$ , and  $38.5 \times 46 \mu$  from anterior to posterior. Anal segment bearing spines on its posterior margin both dorsally and ventrally.

Caudal ramus (Fig. 1f)  $42 \times 21 \mu$  in greatest dimensions, twice as long as wide. Outer lateral seta  $66 \mu$  and naked. Dorsal seta  $22 \mu$  and naked. Outermost terminal seta  $90 \mu$  and innermost terminal seta  $143 \mu$ , both haired along inner edge. Two median terminal setae  $260 \mu$  (outer) and  $370 \mu$  (inner), both with lateral spinules along their midregions. Ramus with a minute hair on its outer margin and ventral terminal flange bearing very minute spinules.

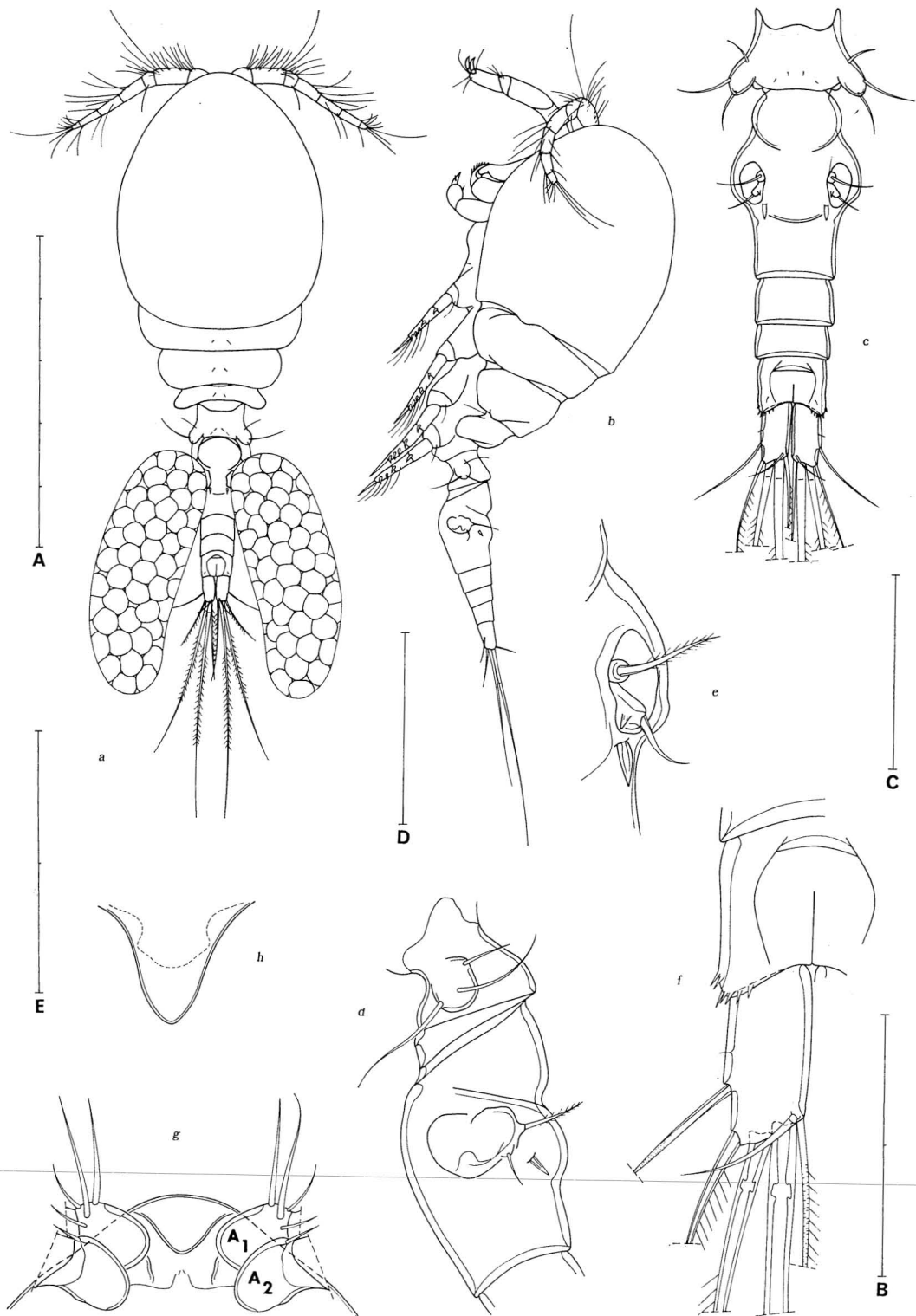


FIG. 1. *Pseudanthessius comanthi* n. sp., female. a, dorsal (A); b, lateral (A); c, urosome, dorsal (B); d, segment of leg 5 and genital segment, lateral (C); e, genital area, dorsal (D); f, caudal ramus, dorsal (D); g, rostrum, ventral (C); h, rostrum in dissection, anteroventral (E).

SCALE: A = 0.5 mm, B = 0.2 mm, C = 0.1 mm, D = 0.05 mm, and E = 0.1 mm. A<sub>1</sub> = first antenna, A<sub>2</sub> = second antenna.

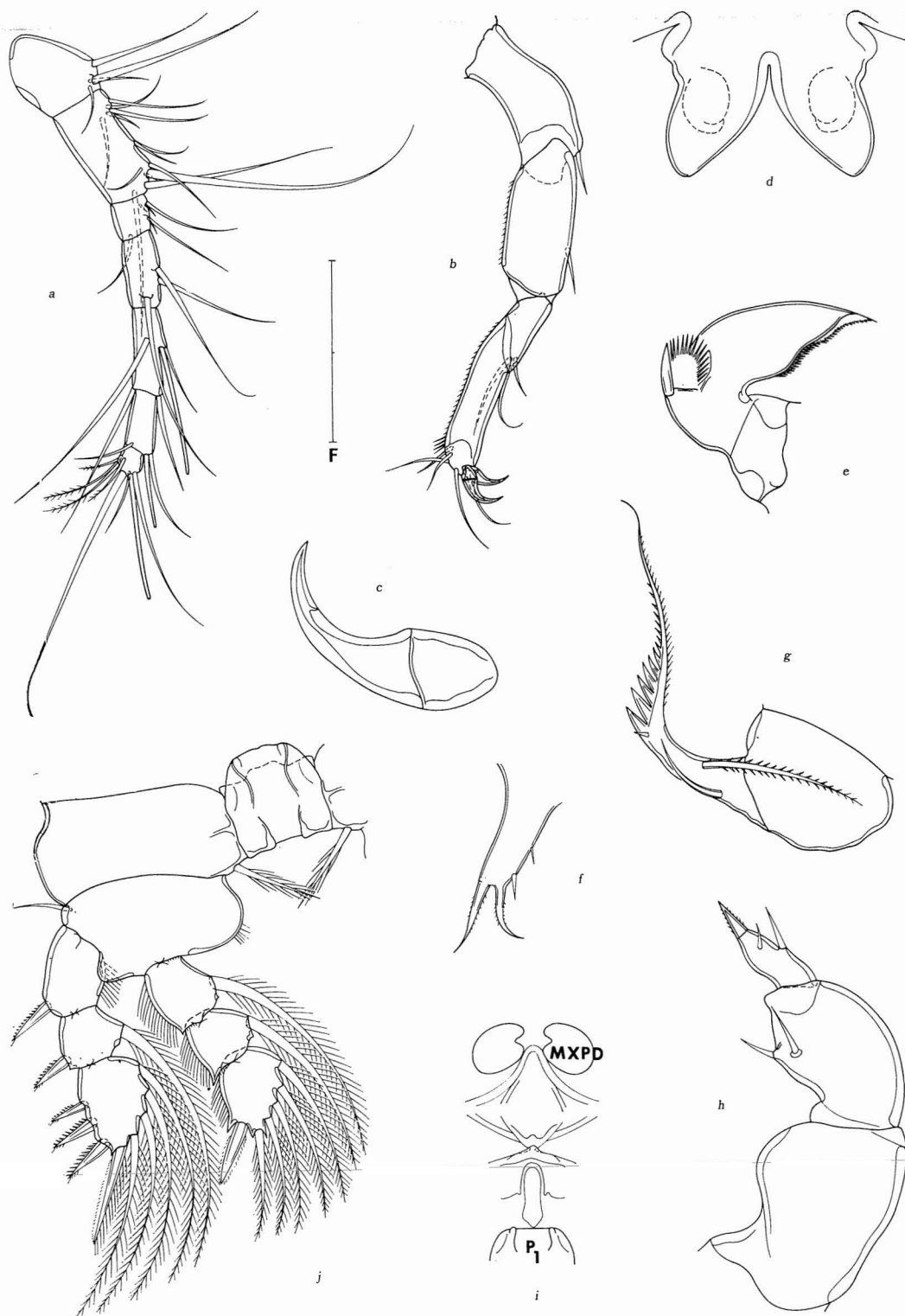


FIG. 2. *Pseudanthessius comanthi* n. sp., female. *a*, first antenna, ventral (C); *b*, second antenna, anterior (C); *c*, claw of second antenna, anterior (F); *d*, labrum, with paragnaths indicated by broken lines, ventral (D); *e*, mandible, anterior (D); *f*, first maxilla, anterior (D); *g*, second maxilla, posterior (D); *h*, maxilliped, inner (D); *i*, area between maxillipeds and first pair of legs, ventral (C); *j*, leg 1 and intercoxal plate, anterior (E).

SCALE: F = 0.02 mm. MXPD = maxilliped, P<sub>1</sub> = leg 1.

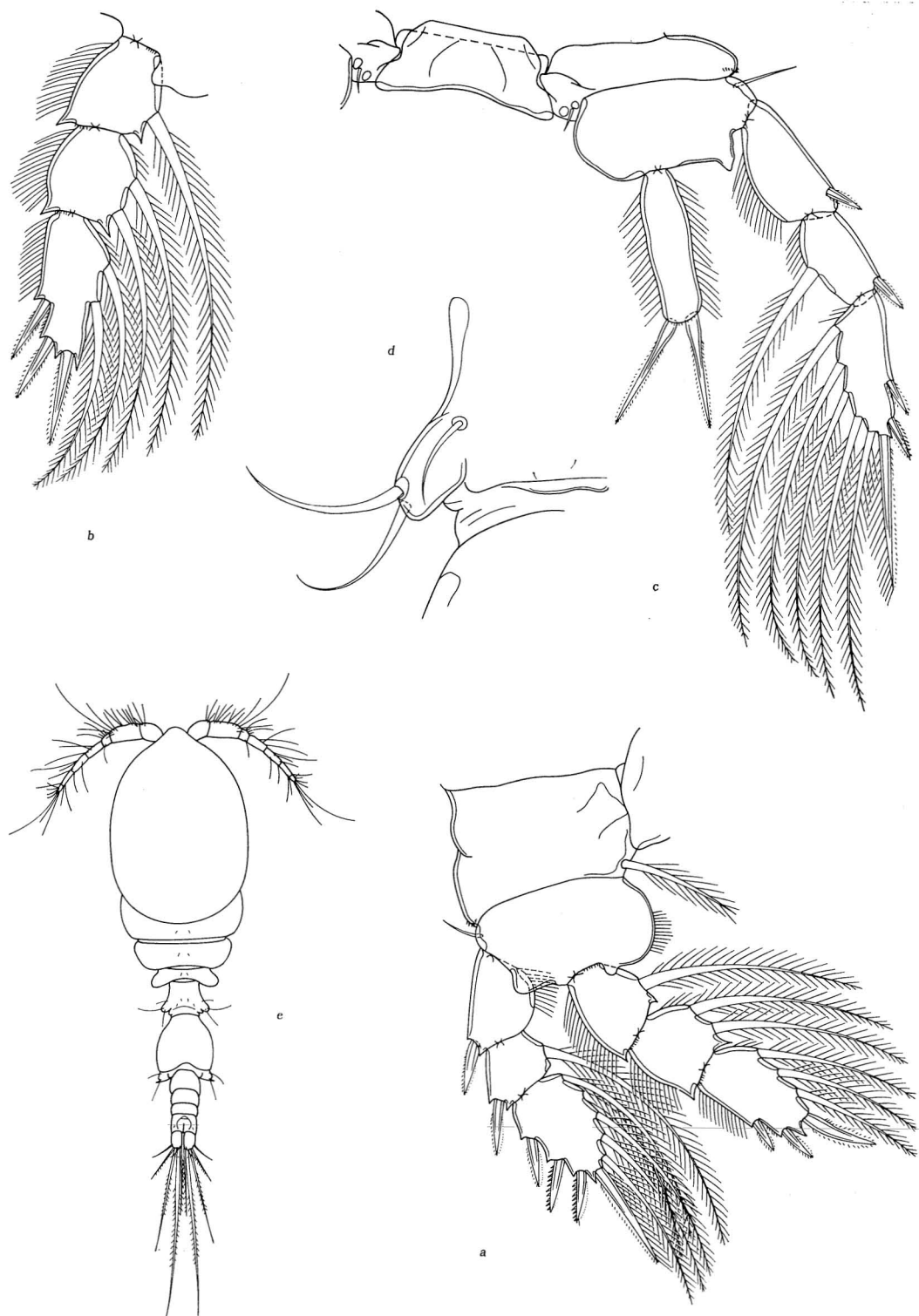


FIG. 3. *Pseudanibessius comanibi* n. sp. Female: *a*, leg 2, anterior (E); *b*, endopod of leg 3, anterior (E); *c*, leg 4 and intercoxal plate, anterior (E); *d*, leg 5, dorsal (D). Male: *e*, dorsal (A).



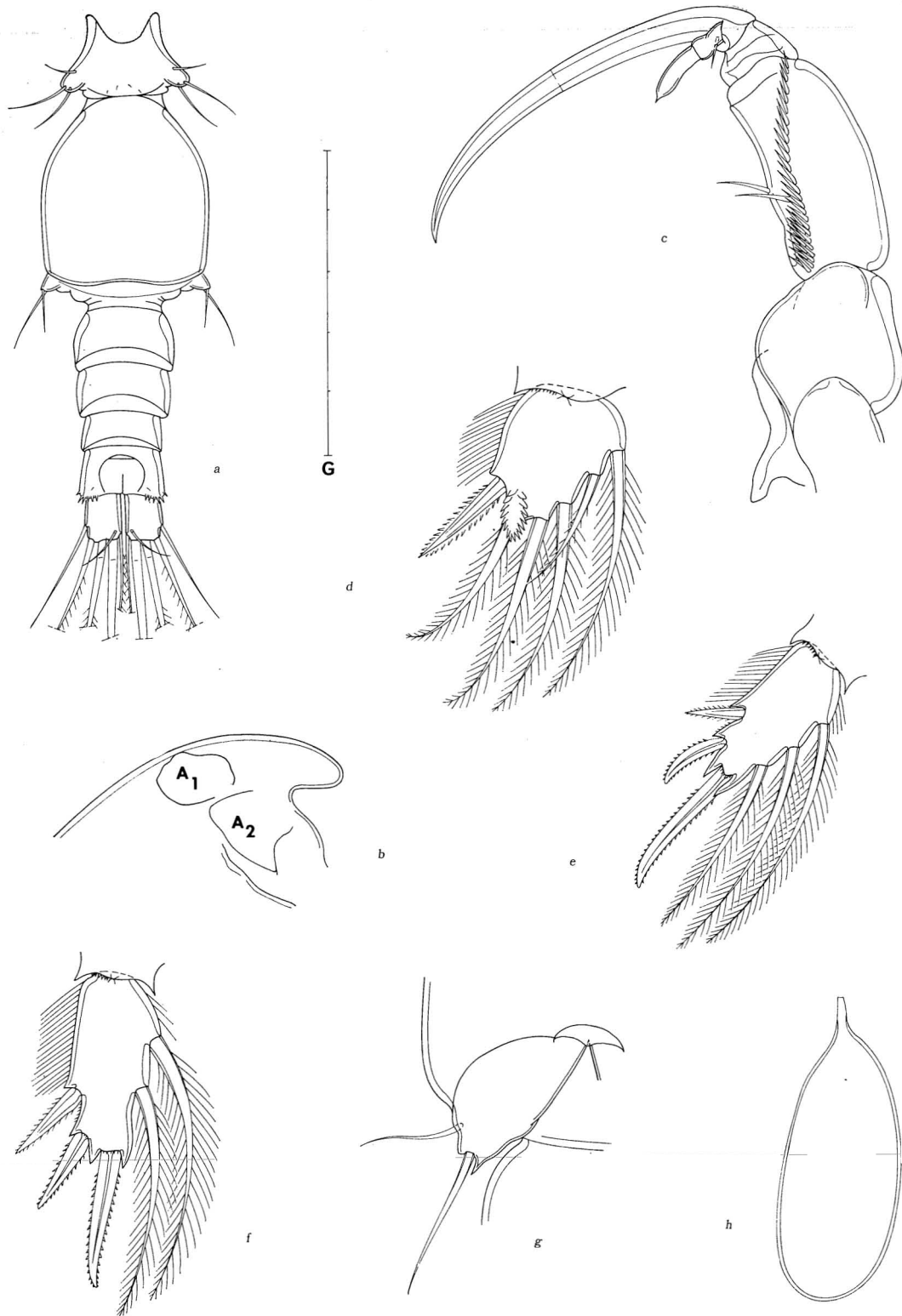


FIG. 4. *Pseudanthessius comanthi* n. sp., male. *a*, urosome, dorsal (C); *b*, rostrum, lateral (E); *c*, maxilliped, inner D; *d*, third segment of endopod of leg 1, anterior (G); *e*, third segment of endopod of leg 2, anterior (D); *f*, third segment of endopod of leg 3, anterior (D); *g*, leg 6, ventral (D); *h*, spermatophore, as seen inside body of male, ventral (D).

SCALE: G = 0.05 mm. A<sub>1</sub> = first antenna, A<sub>2</sub> = second antenna.

Body surface with very few hairs (sensilla).

Egg sac (Fig. 1*a*) elongated,  $370 \times 143 \mu$ , reaching well beyond caudal rami, and containing many eggs about  $45 \mu$  in diameter.

Rostrum (Fig. 1*g*, *b*) linguiform, and in lateral view raised to form a small snoutlike process (see Fig. 4*b* of male).

First antenna (Fig. 2*a*)  $233 \mu$  long. Lengths of seven segments (measured along their posterior nonsetiferous margins): 22 ( $44 \mu$  along anterior edge), 50, 19, 35, 41, 27.5, and  $16.5 \mu$ , respectively. Formula for armature: 4, 13, 6, 3,  $4 + 1$  aesthete,  $2 + 1$  aesthete, and  $7 + 1$  aesthete. All setae naked except four on terminal segment which are weakly plumose.

Second antenna (Fig. 2*b*)  $226 \mu$  long. Second segment distinctly stouter (width  $34 \mu$ ) than third and fourth. Formula: 1, 1, 3, II + 5. Fourth segment  $84 \mu$  along outer edge,  $56 \mu$  along inner edge, and  $17 \mu$  wide, bearing terminally two jointed claws (Fig. 2*c*), both about  $21 \mu$ , and five slender setae. All elements naked. Outer margin of second segment bearing a row of small spinules. This margin of fourth segment with a similar row of spinules, but in addition, bearing a distal row of several longer spinules.

Labrum (Fig. 2*d*) with two slender postero-ventral lobes. Mandible (Fig. 2*e*) having on its convex margin a scalelike area consisting of a spiniform process and an adjacent lamella bearing a crescentic row of spinules; on its concave margin a row of spinules. Lash extremely short and not readily distinguishable from blade. Paragnath (Fig. 2*d*) a small lobe with very short hairs. First maxilla (Fig. 2*f*) with four elements. Second maxilla (Fig. 2*g*) with a large first segment. Slender elongated second segment,

bearing a long barbed seta (often but not always directed proximally) and a shorter naked seta, produced to form a long lash with graded dentiform spines along one edge and small spinules along other. Maxilliped (Fig. 2*h*) three-segmented, second segment with two naked setae, third with two naked setae and having a minutely barbed spiniform tip.

Ventral area between maxillipeds and first pair of legs (Fig. 2*i*) only slightly protuberant (Fig. 1*b*).

Legs 1-4 (Fig. 2*j*, 3*a*, *b*, *c*) having three-segmented rami, except for endopod of leg 4 which is a single segment. Table 1 shows the formula for armature.

Inner coxal seta of legs 1-3 long and plumose, with hairs less erect than in most species and sometimes appressed to give appearance of a lamella; this seta on leg 4 minute ( $8 \mu$ ) and naked. Inner margin of basis of legs 1-3 bearing a few hairs, but in leg 4 naked. In leg 4 exopod  $143 \mu$  long. Endopod  $58 \times 18.5 \mu$ , with both lateral margins haired and two terminal subequal fringed spines  $43 \mu$  (inner) and  $46 \mu$  (outer).

Leg 5 (Fig. 3*d*) bearing three naked setae.

Leg 6 represented by two setae on genital area (Fig. 1*e*).

Living specimens in transmitted light brownish to orange-brown, eye red, egg sacs opaque gray. (Specimens in alcohol when viewed in a mass having a slight grayish hue.)

#### Description of Male

Body (Fig. 3*e*) slender, with rostral area more pointed than in female. Length (excluding ramal setae)  $0.65 \text{ mm}$  ( $0.59\text{--}0.69 \text{ mm}$ ) and greatest width  $0.20 \text{ mm}$  ( $0.19\text{--}0.22 \text{ mm}$ ), based

TABLE 1  
FORMULA FOR ARMATURE FOR LEGS 1-4 OF *Pseudanthessius comanthi* n. sp.

|                |      |     |       |     |            |              |              |                   |
|----------------|------|-----|-------|-----|------------|--------------|--------------|-------------------|
| P <sub>1</sub> | coxa | 0-1 | basis | 1-0 | exp<br>enp | I-0;<br>0-1; | I-1;<br>0-1; | III,I,4<br>I,5    |
| P <sub>2</sub> | coxa | 0-1 | basis | 1-0 | exp<br>enp | I-0;<br>0-1; | I-1;<br>0-2; | III,I,5<br>I,II,3 |
| P <sub>3</sub> | coxa | 0-1 | basis | 1-0 | exp<br>enp | I-0;<br>0-1; | I-1;<br>0-2; | III,I,5<br>I,II,2 |
| P <sub>4</sub> | coxa | 0-1 | basis | 1-0 | exp<br>enp | I-0;<br>II   | I-1;         | II,I,5            |

NOTE: Roman numerals indicate spines; Arabic numerals, setae.

on 10 specimens in lactic acid. Ratio of length to width of prosome 1.83:1. Ratio of length of prosome to that of urosome 1.48:1.

Segment of leg 5 (Fig. 4a)  $37 \times 62 \mu$ . Genital segment  $99 \times 81 \mu$ . Four postgenital segments  $31 \times 46 \mu$ ,  $24 \times 43 \mu$ ,  $17.5 \times 40 \mu$ , and  $25 \times 41 \mu$  from anterior to posterior.

Caudal ramus resembling that of female but shorter,  $26 \times 18.5 \mu$ , with ratio 1.4:1.

Body surface ornamented as in female.

Rostrum (Fig. 4b), labrum, mandible, paragnath, first maxilla, and second maxilla like those of female. Maxilliped (Fig. 4c) slender and four-segmented (assuming that proximal part of claw represents fourth segment). Second segment bearing two naked setae and two unequal rows of spines. Claw  $104 \mu$  along its axis (including terminal lamella), showing very weak indication of division about midway, and bearing proximally two elements, one a small slender seta, other a two-segmented broad digitiform seta with a mucronate tip.

Ventral area between maxillipeds and first pair of legs like that of female.

Legs 1–4 with same segmentation and spine and setal formula as in female. Sexual dimorphism occurring, however, in third segment of endopod of legs 1–3. On third segment of endopod of leg 1 (Fig. 4d) medial to spine a conspicuous process ringed with flattened spines and next to innermost seta much shorter than others. On third segment of endopod of leg 2 (Fig. 4e) three spines slightly modified and more strongly sclerotized than in female, their lengths being 14, 19, and  $36 \mu$  from outer to inner (as opposed to 17.5, 17.5, and  $28.5 \mu$  in female). Two long spiniform processes near insertion of terminal spine, instead of one as in female. On third segment of endopod of leg 3 (Fig. 4f) a slighter degree of dimorphism, with three spines being 22, 22, and  $32 \mu$  from outer to inner (as opposed to 27, 27, and  $33 \mu$  in female). Leg 4 like that of female.

Leg 5 similar to that of female.

Leg 6 (Fig. 4g) a posteroventral flap on genital segment, bearing two naked setae  $22 \mu$  and  $38 \mu$  and a small spiniform process.

Spermatophore (Fig. 4b), seen only inside genital segment of male, elongated,  $70 \times 28 \mu$ , not including neck.

Living specimens colored as in female.

### Etymology

The specific name *comanthi* is formed from the generic name of the host.

### Remarks

Twelve species of *Pseudanthessius* have in common with *P. comanthi* three easily discernible features: a five-segmented urosome in the female, the longest seta on the basal segment of the first antenna less than half the length of the appendage, and two claws on the second antenna. Among these 12 species two Indian forms, *P. minutus* Reddiah, 1968, and *P. anomalus* Ummerkutty, 1966, are incompletely described, but may be distinguished from the new species by their nearly quadrate caudal rami. Four species—*P. foliatus* Stock, 1967; *P. pusillus* Humes, 1969; *P. procurrens* Humes, 1966; and *P. pectinifer* Stock, Humes, & Gooding, 1963—are unlike *P. comanthi* in having a long attenuated mandibular lash. *P. ferox* Humes & Ho, 1967, is distinctive in possessing two spike-like processes on the labrum. None of these seven species is associated with crinoids.

The remaining five species—*P. major* Stock, 1967; *P. minor* Stock, 1967; *P. madrasensis* Reddiah, 1968; *P. angularis* Humes and Ho, 1970; and *P. rostellatus* Humes and Ho, 1970—are associated with crinoids. In these the mandible has, as in *P. comanthi*, a scalelike area on its convex edge and an extremely short terminal lash. They may be separated from the new species by their short female caudal ramus (about as long as wide or slightly longer than wide), by the shape of the female genital segment, and by details of the male maxilliped.

As far as known only one other species, *P. rostellatus*, has, as in *P. comanthi*, a pair of spines on the dorsal surface of the genital segment in the female. This and other similarities, such as the form of the second antenna, suggest a close relationship between the two copepods.

Nothing is known of the geographical distribution of *P. comanthi* beyond the collections from Eniwetok Atoll, but it might be expected wherever *Comanthus bennetti* occurs. According to Clark (1931:544) the geographical range of the host is "from the Andaman Islands to northern Australia, the Loyalty, Pelew, and Marshall Islands, the Philippines, and Macclesfield Bank." Later Clark (1952) reported this

crinoid from Rongelap Atoll in the Marshall Islands.

#### LITERATURE CITED

- CLARK, A. H. 1931. A monograph of the existing crinoids. Vol. I. The comatulids. Part 3. Superfamily Comasterida. Bull. U.S. Nat. Mus. 82:i-vii, 1-816.
- . 1952. Echinoderms from the Marshall Islands. Proc. U.S. Nat. Mus. 102(3302): 265-303.
- HUMES, A. G. 1966. *Pseudanthessius procurrens* n. sp., a cyclopoid copepod associated with a cidarid echinoid in Madagascar. Breviora, no. 246:1-14.
- . 1969. *Pseudanthessius pusillus* n. sp., a cyclopoid copepod associated with a clypeastroid echinoid in Madagascar. Zool. Anz. 183(3/4):268-277.
- HUMES, A. G., and J.-S. HO. 1967. New cyclopoid copepods associated with polychaete annelids in Madagascar. Bull. Mus. Comp. Zool. Harv. 135(7):377-414.
- . 1970. Cyclopoid copepods of the genus *Pseudanthessius* associated with crinoids in Madagascar. Smithson. Contr. Zool., no. 54: 1-20.
- REDDIAH, K. 1968. Two new *Pseudanthessius* species (Copepoda-Lichomolgidae) from the Madras harbour. J. Mar. Biol. Ass. India, 1966, 8(2):320-328.
- STOCK, J. H. 1967. Copepoda associated with invertebrates from the Gulf of Aqaba. 3. The genus *Pseudanthessius* Claus, 1889 (Cyclopoida, Lichomolgidae). Proc. K. ned. Akad. Wet. ser. C, 70(2):232-248.
- STOCK, J. H., A. G. HUMES, and R. U. GOODING. 1963. Copepoda associated with West Indian invertebrates. IV. The genera *Octopicola*, *Pseudanthessius* and *Meomicola* (Cyclopoida, Lichomolgidae). Stud. Fauna Curacao 18(77):1-74.
- UMMERKUTTY, A. N. P. 1966. Description of two species of cyclopoid copepods, *Pseudanthessius anormalus* n. sp. and *P. brevicauda* n. sp. Proc. Symp. Crustacea, Ernakulam, pt. 1:107-113.